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Case Report

Neuroendoscopic treatment of symptomatic giant Virchow–Robin spaces

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Abstract

Background: Virchow–Robin spaces (VRS) or perivascular spaces are interstitial cystic spaces surrounding the vasculature of brain parenchyma and course from the subarachnoid space. Small VRS (<2 mm) appear in all age groups, but can enlarge and be confused with other lesions like cystic neoplasms. These enlarged VRS are termed giant tumefactive perivascular spaces (GRPVS).

Case Description: We present the case of a 50-year-old male who presents with right eye pain, blurred vision, headache, and

gait imbalance. He was diagnosed with GRPVS and underwent an endoscopic third ventriculostomy and cyst fenestration. Postoperative imaging showed a decrease in size of the ventricular system with evidence of fl ow through the aqueduct and ventriculostomy. Brainstem VRS cysts decreased in size.

Conclusion: Unlike the other small number of case reports, this patient is unique in his age of presentation and successful endoscopic method of treatment. The endoscopic approach provided great exposure and adequate access to the lesions. Clinically, symptoms improved, cyst size decreased, and need for permanent shunt placement was averted.

Key Words: Cyst fenestration, endoscopy, neuroendoscopy, Virchow–Robin spaces

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INTRODUCTION

Virchow–Robin spaces (VRS) are spaces that surround the walls of vessels within the brain parenchyma. VRS are found in all age groups but may increase in size and frequency with age.[4] These spaces may also become very large and assume bizarre configurations and cause a mass effect.[4] Expanded VRS causing the mass effect is uncommon but can result in hydrocephalus requiring shunting. This case describes a 50-year-old man with dilated VRS and secondary hydrocephalus who was treated surgically with endoscopic third ventriculostomy (ETV) and cyst fenestration.

CASE REPORT

History

This 50-year-old male presented to our inpatient neurosurgical serve with complaints of right eye pain, blurred vision and occasional diplopia, headache, and gait difficulty with frequent falls due to imbalance. He denies numbness or weakness of extremities. Past medical history included type II diabetes, hypertension, and hyperlipidemia.

Examination

On exam, he was alert and oriented to person, place, and time. He had decreased vision in right eye and diplopia

on extreme lateral gaze. Subtle horizontal nystagmus was noted. The remaining cranial nerve exam was grossly intact. Patient had normal strength and sensation in all four extremities. He had negative Romberg sign but mildly ataxic gait. Magnetic resonance imaging (MRI) without contrast showed a stable cluster of three cysts centered within the tegmentum of the right midbrain, which in aggregate measured 2.2 cm × 1.4 cm × 1.4 cm [Figure 1]. There was a dominant dorsomedial cyst upto 1.7 cm in maximum dimension with associated compression on the adjacent cerebral aqueduct. There was mild associated hydrocephalus with distention of the lateral and third ventricles [Figure 2].

Operation

Under general anesthesia, the patient was fixed in Mayfield head holder, and stereotactic navigation was registered for use during the procedure. Two burr holes were placed. A posterior burr hole was planned in the right frontal area near the coronal suture in order to perform the ETV. A second burr hole was planned anterior to the first one in order to access the brainstem cyst and the posterior third ventricle. The endoscope was introduced through the posterior burr hole into the lateral ventricle and through the foramen of Monro into the third ventricle. Third ventriculostomy was performed in the usual fashion in the floor of the ventricle, anterior to the mammillary bodies. Next, the endoscope was introduced through the anterior frontal burr hole and taken into the third ventricle through the foramen of Monro in a more posterior trajectory in order to reach the brainstem cyst. Fenestration of the cyst was performed with the endoscopic bipolar. Contents of the cyst were consistent with pure cerebrospinal fluid. An external ventricular drain (EVD) was left for intracranial pressure monitoring following the procedure. The closure was done using burr hole covers and routine skin closure. The patient tolerated the procedure well and was transferred to the intensive care unit for further monitoring and care.

Postoperative course

Intracranial pressures remained within normal limits, and the EVD was removed the following morning after surgery. Patient was able to ambulate without assistance with minimal pathway deviations and perform daily activities of living independently. Cognition remained intact, and he conversed appropriately. Postoperative MRI showed a decrease in size of the ventricular system with evidence of flow through the aqueduct and ostium of the ETV. There was a stable appearance of cystic lesions in the brain stem with some decrease in size [Figure 3].

At 1-month follow-up his gait, diplopia, and headache had significantly improved. At 5 months, headache, and diplopia had essentially resolved, and computed tomography scan showed well-decompressed cyst and ventricles [Figure 4].

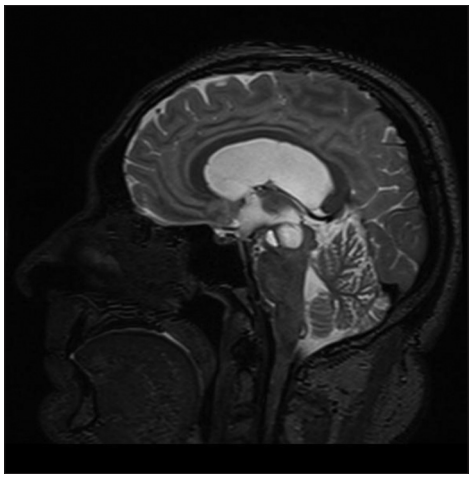

Figure 1: Magnetic resonance imaging sagittal T2-weighted sequence demonstrating cystic perivascular spaces in midbrain tegmentum with distention of the third ventricle and bowing of the corpus callosum

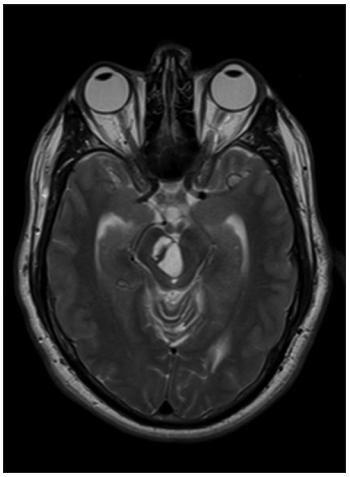

Figure 2: Magnetic resonance imaging axial T2-weighted sequence demonstrating cystic perivascular spaces in midbrain tegmentum with local mass effect on aqueduct of Sylvius

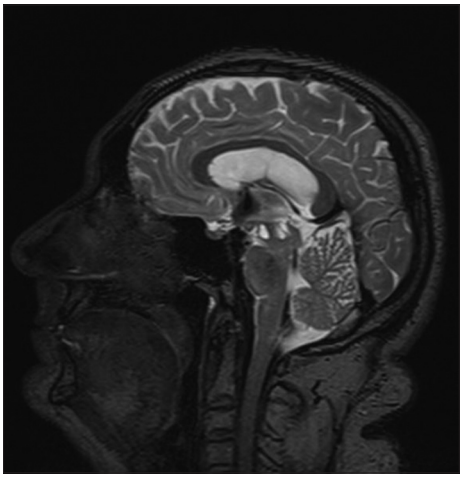

Figure 3: Postoperative magnetic resonance imaging sagittal T2-weighted sequence demonstrating decompression of cystic perivascular spaces and resolving distention of the third ventricle

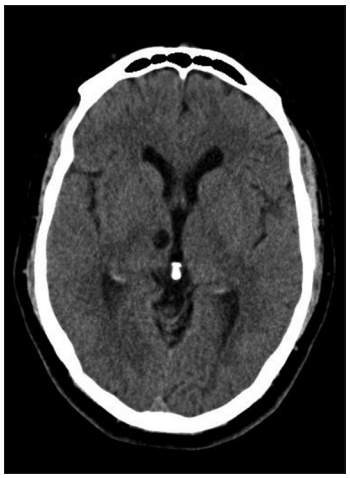

Figure 4: Five-month follow-up computed tomography axial sequence showing decompression of lateral and third ventricles

DISCUSSION

Virchow–Robin spaces are interstitial fluid-filled potential spaces that surround cerebral arteries and arterioles.[4,8] These spaces are normal anatomical structures within the brain and are believed to be in contact with the lymphatic drainage channels of the head and neck and drain to the cervical lymph nodes.[4] The purpose of VRS are not completely understood, but one theory postulates they provide a route of entry for macrophages and lymphocytes into cerebrospinal fluid spaces.[9] Sometimes, VRS can be markedly enlarged and assume bizarre cystic configurations that can cause a mass effect.[4] Expanding dilation of perivascular spaces is uncommon. There are a few previous case reports of patients with mesencephalic-diencephalic lesions treated surgically, primarily with ventricular shunting.[2,6] There are several surgical options including ventriculoperitoneal or cystoperitoneal shunting to neuroendoscopic decompression with cysteocisternotomy or ventriculocystostomy.[3,5,7] One case report of a 6-year-old boy described the use of endoscopic drainage of a midbrain cyst abutting the ventricular system, but remaining endoscopy could not be performed due to anatomic distortion.[1] The patient improved and showed a decrease in cystic size. In our patient, an ETV was performed successfully in combination with cyst fenestration resulting in resolution of hydrocephalus without additional shunt placement. We believe that the endoscopic approach provided great exposure and adequate access to the lesion and allowed a method of cerebrospinal fluid diversion which averts the need for shunting.

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